

## ELEUTHEROCOCCUS VS. ACANTHOPANAX

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IN RESPONSE TO a growing interest in the use of ginseng, chemists and physicians have investigated the chemistry and the physiological activities of crude drugs prepared from the roots and bark of *Panax ginseng* C. A. Meyer and other araliaceous plants. Included in these studies have been the Chinese drugs known as *Wu-chia-p'i*, which are prepared from the bark of different species of *Eleutherococcus*. The investigations have resulted in the isolation of sitosterol glycosides from *Eleutherococcus senticosus* (Rupr. & Maxim.) Maxim., and in the discovery of similar physiological responses induced by these glycosides and the ginsenosides of *P. ginseng* (Brekham, 1969; Anonymous, 1976). Because of these similarities, extracts from species of *Eleutherococcus* have been used as substitutes for ginseng. Communicating the results of the chemical and physiological studies has often proved difficult and confusing since species of *Eleutherococcus* have sometimes been included in the genus *Acanthopanax*, and the nomenclature has been unstable. A summary of the taxonomy of these two genera and necessary nomenclatural changes are presented here in order to clarify this situation and to provide a more stable and less confusing nomenclature.

A survey of the pertinent literature indicates that *Eleutherococcus* Maxim. (typified by *E. senticosus*) is the earliest validly published name for the genus that some authors have called *Acanthopanax* (Decaisne & Planchon) Miquel (typified by *A. spinosus* (L. f.) Miquel). Decaisne and Planchon (1854) used *Acanthopanax* as a subgenus of *Panax* L., and later Miquel (1863) raised the subgenus to generic level. Harms (1894) combined *Acanthopanax* and *Eleutherococcus*, but he used *Acanthopanax* as the generic name and recognized *Eleutherococcus* at sectional rank. Harms's treatment has been followed by Rehder (1940, 1949), Li (1942), horticultural authors, and floristic botanists in China and Japan. However, in 1924 Nakai recognized both *Acanthopanax* and *Eleutherococcus* as distinct genera, and his treatment has been adopted by Poyarkova (1973).

The characters utilized by Poyarkova to separate the two genera are "ovary 2-locular, styles 2; fruit with 2 stones; petioles glabrous or scarcely pubescent, articulate with rachis" for *Acanthopanax*, and "ovary 5-locular, styles 5, fruit with 5 stones; petioles not articulate, densely pubescent" for *Eleutherococcus*. These characters may hold for distinguishing the two species (one placed in each genus) that occur in the relatively limited area of the Soviet Far East, which constitutes the periphery of the generic range, but they are of no generic value when species from over the entire geographic range are considered. Even for the small number of Japanese species, Nakai (1924)

remarked that the "characters distinguishing *Eleutherococcus* from *Acanthopanax* are neither the cohesiveness of the styles nor the presence of articulation in the flowers. . . . The seeming articulation appears in the dried specimens by the contraction of tissue . . . [but is a] . . . false articulation." Nakai separated the genera by utilizing the number of "styles and the number of cells in the ovary as well as the shape of the pyrenes." He attributed 2 styles, 2 or 3 ovary cells, and flat pyrenes with roundish ventral sides to *Acanthopanax*, and 5 styles, 3 to 6 ovary cells, and pyrenes with an acute or somewhat acute ventral side to *Eleutherococcus*.

Like the characters used by Poyarkova, Nakai's characters do not hold when all of the taxa attributed to the two genera are examined. In all species the endocarps mature separately into hard shells, each covering an individual seed to form a pyrene. The shape of the ventral (adaxial) side of the pyrene depends upon the number of ovary cells. The variation in the number of cells in the ovaries (and, in turn, in the number of pyrenes) is correlated with the number of styles—observations of one flowering branch of *Eleutherococcus trifoliatus* (L.) S. Y. Hu has shown some flowers with 2 or 3 styles (these united up to the middle) and others with 6 (these free to the base).

When all of the species attributed to the two genera are examined, there is not one constant character that can be used to separate *Eleutherococcus* from *Acanthopanax*. The genus is a natural one consisting of spinose shrubs with compound leaves, sessile or pedicellate flowers arranged in simple, solitary or racemose umbels or heads, and flowers with 2- to 6-celled ovaries. *Eleutherococcus* (from the Greek *eleuthero*, free, and *kokkos*, seed, in allusion to the separated pyrenes) is the correct generic name.

Rehder's treatment (1940, 1949) of the genus and its sections is followed here with two exceptions. The unarmed, arboreus species with trifoliolate leaves, corymbose-paniculate umbels, and drupes consisting of 2 dorsiventrally flattened pyrenes are placed in *Evodiopanax* Nakai (see Ohwi, 1965). Another unarmed, arboreus species with (3-, 4-, or) 5-foliate leaves and loosely arranged corymbose-paniculate umbels is left in *Kalopanax* (*K. sciadophylloides* (Franchet & Savatier) Harms). A total of fifteen species and seven varieties from China, Korea, and Japan are transferred below from *Acanthopanax* to *Eleutherococcus*, and one variety from *Acanthopanax* to *Evodiopanax*. Important literature is cited to provide access to descriptions of the taxa as well as more complete references.

**Eleutherococcus** Maxim. Mém. Acad. Sci. St.-Pétersb. Sav. Étr. 9: 132. 1859;  
Bentham & Hooker f. Gen. Pl. 1: 941. 1867; Nakai, Jour. Arnold Arb. 5: 9. 1924, Fl. Sylv. Kor. 16: 26. 1927.

**Panax** subgen. *Acanthopanax* Decaisne & Planchon, Revue Hort. 1854:  
105. 1854.

*Acanthopanax* (Decaisne & Planchon) Miquel, Ann. Mus. Bot. Lugd.-Bat.  
1: 10. 1863; Harms in Engler, Nat. Pflanzenfam. III. 8: 49. 1894; Rehder,  
Man. 676. 1940, Bibliogr. 492. 1949; Li, Sargentia 2: 69. 1942; Ohwi,  
Fl. Japan (Eng. ed.) 664. 1965; Anonymous, Ic. Corm. Sin. 2: 1035.  
1972.

*Acanthopanax* sect. *Eleutherococcus* (Maxim.) Harms in Engler, Nat. Pflanzenfam. III. 8: 49. 1894.

**Eleutherococcus divaricatus** (Sieb. & Zucc.) S. Y. Hu, comb. nov.

*Panax divaricatus* Sieb. & Zucc. Abh. Bayer. Akad. Math.-Phys. Kl. 4(2): 200. 1845 (as *divaricatum*).

*Acanthopanax divaricatus* (Sieb. & Zucc.) Seemann, Jour. Bot. London 5: 239. 1867; Li, Sargentia 2: 76. 1842.

**Eleutherococcus giraldii** (Harms) Nakai var. *pilosulus* (Rehder) S. Y. Hu, comb. nov.

*Acanthopanax giraldii* Harms var. *pilosulus* Rehder, Jour. Arnold Arb. 9: 99. 1928; Li, Sargentia 2: 81. 1942.

**Eleutherococcus gracilistylus** (W. W. Sm.) S. Y. Hu, comb. nov.

*Acanthopanax gracilistylus* W. W. Sm. Notes Bot. Gard. Edinburgh 10: 6. 1917.

**Eleutherococcus gracilistylus** var. *pubescens* (Pampanini) S. Y. Hu, comb. nov.

*Acanthopanax spinosus* (L. f.) var. *pubescens* Pampanini, Nuovo Giorn. Bot. Ital. II. 17: 678. 1911.

*Acanthopanax gracilistylus* W. W. Sm. var. *pubescens* (Pampanini) Li, Sargentia 2: 85. 1942.

**Eleutherococcus henryi** Oliver var. *faberi* (Harms) S. Y. Hu, comb. nov.

*Acanthopanax henryi* (Oliver) Harms var. *faberi* Harms, Mitt. Deutsch. Dendrol. Ges. 27: 12. 1918; Li, Sargentia 2: 75. 1942.

**Eleutherococcus lasiogyne** (Harms) S. Y. Hu, comb. nov.

*Acanthopanax lasiogyne* Harms in Sargent, Pl. Wils. 2: 563. 1916; Li, Sargentia 2: 78. 1942.

**Eleutherococcus nodiflorus** (Dunn) S. Y. Hu, comb. nov.

*Acanthopanax nodiflorus* Dunn, Jour. Bot. London 47: 199. 1909.

*Acanthopanax gracilistylus* W. W. Sm. var. *nodiflorus* (Dunn) Li, Sargentia 2: 86. 1942.

**Eleutherococcus phanerophlebius** (Merr.) S. Y. Hu, comb. nov.

*Acanthopanax phanerophlebius* Merr. Sunyatsevia 2: 12. pl. 6. 1934.

**Eleutherococcus rufinervis** (Nakai) S. Y. Hu, comb. nov.

*Acanthopanax rufinervis* Nakai, Fl. Sylv. Kor. 16: 25. 1927 (as *rufinerve*).

**Eleutherococcus seoulensis** (Nakai) S. Y. Hu, comb. nov.

*Acanthopanax seoulensis* Nakai, Fl. Sylv. Kor. 16: 24. fig. 4. 1927 (as *seoulense*).

**Eleutherococcus sessiliflorus** (Rupr. & Maxim.) S. Y. Hu, comb. nov.

*Panax sessiliflorus* Rupr. & Maxim. Bull. Phys.-Math. Acad. Sci. St.-Pétersb. 15: 133. 1857.

*Acanthopanax sessiliflorus* (Rupr. & Maxim.) Seemann, Jour. Bot. London **5**: 239. 1867; Li, Sargentia **2**: 77. 1942.

**Eleutherococcus sessiliflorus** var. **parviceps** (Rehder) S. Y. Hu, comb. nov.

*Acanthopanax sessiliflorus* (Rupr. & Maxim.) Seemann var. *parviceps* Rehder, Mitt. Deutsch. Dendrol. Ges. **21**: 129. 1912.

**Eleutherococcus setulosus** (Franchet) S. Y. Hu, comb. nov.

*Acanthopanax setulosus* Franchet, Nouv. Arch. Mus. Hist. Nat. Paris II. **8**: 249. 1885; Li, Sargentia **2**: 82. 1942.

**Eleutherococcus sieboldianus** (Makino) Koidzumi f. *variegatus* (Rehder) S. Y. Hu, comb. nov.

*Acanthopanax pentaphylla* Marchal var. *variegatum* Hort. ex Rehder in Bailey, Cycl. Am. Hort. **1**: 11. 1900.

*Acanthopanax sieboldianus* Makino f. *variegatus* Rehder, Jour. Arnold Arb. **7**: 243. 1926; Bibliogr. 493. 1949.

**Eleutherococcus spinifolia** (Merr.) S. Y. Hu, comb. nov.

*Acanthopanax spinifolia* Merr. Philip. Jour. Sci. **15**: 249. 1919.

**Eleutherococcus spinosus** (L. f.) S. Y. Hu, comb. nov.

*Panax spinosum* L. f. Suppl. Pl. 441. 1781.

*Acanthopanax spinosus* (L. f.) Miquel in Ann. Mus. Bot. Ludg.-Bat. **1**: 10. 1863 (as *spinosum*), p. p., *quod basionym*, exclud. descript.; Rehder, Man. 678. 1940, Bibliogr. 493. 1949.

**Eleutherococcus stenophyllus** (Harms) Nakai f. *angustissimus* (Rehder) S. Y. Hu, comb. nov.

*Acanthopanax stenophyllus* Harms f. *angustissimus* Rehder, Jour. Arnold Arb. **9**: 99. 1928; Li, Sargentia **2**: 82. 1942.

**Eleutherococcus stenophyllus** (Harms) Nakai f. *dilatatus* (Rehder) S. Y. Hu, comb. nov.

*Acanthopanax stenophyllus* Harms f. *dilatatus* Rehder, Jour. Arnold Arb. **13**: 339. 1932; Li, Sargentia **2**: 82. 1942.

**Eleutherococcus trifoliatus** (L.) S. Y. Hu, comb. nov.

*Zanthoxylum trifoliatum* L. Sp. Pl. 270. 1753.

*Acanthopanax trifoliatus* Voss, Vilmor. Blumengärtn. **1**: 406. 1894; Merr. Philip. Jour. Sci. **1**(Suppl.): 217. 1906; Li, Sargentia **2**: 86. 1942; Rehder, Bibliogr. 493. 1949.

**Eleutherococcus villosulus** (Harms) S. Y. Hu, comb. nov.

*Acanthopanax villosulus* Harms in Sargent, Pl. Wils. **2**: 562. 1916.

*Acanthopanax gracilistylus* W. W. Sm. var. *villosulus* (Harms) Li, Sargentia **2**: 85. 1942.

**Eleutherococcus wardii** (W. W. Sm.) S. Y. Hu, comb. nov.

*Acanthopanax wardii* W. W. Sm. Notes Bot. Gard. Edinburgh **10**: 7. 1917; Li, Sargentia **2**: 88. 1942; Rehder, Bibliogr. 493. 1949.

*Acanthopanax ternatus* Rehder, Jour. Arnold Arb. **2**: 124. 1924; Man. ed. 2. 678. 1940.

*Eleutherococcus yui* (Li) S. Y. Hu, comb. nov.

*Acanthopanax yui* Li, Sargentia **2**: 79. 1942.

*Evodiopanax evodiifolius* (Franchet) Nakai var. *gracilis* (W. W. Sm.) S. Y. Hu, comb. nov.

*Acanthopanax evodiifolius* var. *gracilis* W. W. Sm. in Notes Bot. Gard. Edinburgh **10**: 6. 1917 (as *evodiaefolius*).

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